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IS 11249 (1985): Data sheet for selection of front end loaders [MED 7: Material Handling Systems and Equipment]



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Indian Standard

## DATA SHEET FOR SELECTION OF FRONT END LOADERS

**1. Scope** — Lays down the data required for selection of front end loaders.

### 2. Data Sheet

#### 2.1 Application and Site Data

- a) Applicable to: Proposal \_\_\_\_\_ Purchase \_\_\_\_\_ As built \_\_\_\_\_ Date \_\_\_\_\_
- b) Service \_\_\_\_\_ Continuous/Intermittent; Days per year \_\_\_\_\_ days
- c) Duty: Operating hours per shift \_\_\_\_\_ h; Shifts per day \_\_\_\_\_
- d) Site altitude \_\_\_\_\_
- e) Relative humidity, *Max* at \_\_\_\_\_ °C \_\_\_\_\_ percent
- f) Temperature: *Max* \_\_\_\_\_ *Min* \_\_\_\_\_
- g) Rainfall: Average \_\_\_\_\_ *Max* \_\_\_\_\_
- h) Type \_\_\_\_\_
- i) Environment \_\_\_\_\_

#### 2.2 Material Handled Data

- a) Material \_\_\_\_\_
- b) Average size \_\_\_\_\_ mm
- c) Maximum size \_\_\_\_\_ mm
- d) Percentage of maximum size \_\_\_\_\_
- e) Bulk density \_\_\_\_\_ kg/m<sup>3</sup>
- f) Angle of repose \_\_\_\_\_
- g) Moisture content \_\_\_\_\_ percent
- h) Temperature \_\_\_\_\_ °C
- i) Flowability (Flow property) \_\_\_\_\_
- k) Abrasiveness \_\_\_\_\_
- m) Chemical activity \_\_\_\_\_ Corrosive/Hygroscopic/Abrasive

#### 2.3 Engine

- a) Model \_\_\_\_\_
- b) Type: Diesel/Petrol; Inline/V-type; Two stroke/Four stroke \_\_\_\_\_
- c) Cooling system \_\_\_\_\_ Air cooled/Water cooled
- d) Gross power \_\_\_\_\_ kW at \_\_\_\_\_ rev/min
- e) Flywheel power \_\_\_\_\_ kW at \_\_\_\_\_ rev/min
- f) Maximum torque \_\_\_\_\_ kN m at \_\_\_\_\_ rev/min
- g) Specific fuel consumption \_\_\_\_\_ g/kWh at \_\_\_\_\_
- h) Nature of aspiration \_\_\_\_\_ Natural/Super charged/Turbo charged/Blower charged
- j) Number of cylinders \_\_\_\_\_
- k) Bore (mm) × Stroke (mm) \_\_\_\_\_

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- m) Displacement \_\_\_\_\_ litres
- n) Type of fuel used \_\_\_\_\_
- p) Type of fuel pump \_\_\_\_\_
- q) Filtration system; Type \_\_\_\_\_ dry/wet
- r) Service indicator \_\_\_\_\_ provided/not provided
- s) Derating factor \_\_\_\_\_
- t) Position of engine \_\_\_\_\_ Front/Rear

Note — In case of super charged and turbo-charged engines, derating factor shall be specified by the manufacturer.

## 2.4 Transmission

- a) Model \_\_\_\_\_
- b) Type \_\_\_\_\_ Mechanical/Hydrostatic/Hydrodynamic/Electric \_\_\_\_\_
- c) Stall ratio ( *In case of hydrodynamic transmission* ) \_\_\_\_\_
- d) Type of drive \_\_\_\_\_ Two wheel/Four wheel
- e) Travel speeds in km/h:

Direction of Motion or Movement	Speed Range		
	First gear	Second gear	Third gear
Forward			
Reverse			

- f) Neutral start \_\_\_\_\_ Provided/Not provided
- g) Controls \_\_\_\_\_ Single/Multi levers
- h) Hydraulic system ( *in case of hydrostatic and hydrodynamic transmission, details of system shall be specified* ) \_\_\_\_\_
- j) Gradeability; laden \_\_\_\_\_ ; unladen \_\_\_\_\_
- k) Gradeability in upward direction without load \_\_\_\_\_

## 2.5 Axles ( For Wheeled Loaders Only )

- a) Make and model \_\_\_\_\_
- b) Type \_\_\_\_\_
- c) Type of reduction \_\_\_\_\_ Reduction ratio \_\_\_\_\_
- d) Type of differential \_\_\_\_\_
- e) Oscillation; Rear axle \_\_\_\_\_  $\pm$  ° Front axle \_\_\_\_\_  $\pm$  °
- f) Wheel lift ( Total ) \_\_\_\_\_

## 2.6 Final Drive

- a) Type \_\_\_\_\_ Single/double reduction planetary
- b) Reduction ratio \_\_\_\_\_
- c) Lubrication system \_\_\_\_\_

**2.7 Under Carriage ( For Crawler Loaders Only )**

- a) Suspension \_\_\_\_\_
- b) No. of roller: Carrier roller \_\_\_\_\_ Track roller \_\_\_\_\_
- c) Sheet
  - 1) Type: Single grouser/Multi grouser
  - 2) Grouser height \_\_\_\_\_ mm
  - 3) No. of shoes \_\_\_\_\_
  - 4) Pitch \_\_\_\_\_ mm
  - 5) Width \_\_\_\_\_ mm
- d) Ground contact area \_\_\_\_\_ mm<sup>2</sup>

**2.8 Steering ( For Wheel Loaders Only )**

- a) Type \_\_\_\_\_
- b) Articulated steering/Pivot steering/Skid steering \_\_\_\_\_
- c) System \_\_\_\_\_
  - i) Type ( drum, disc; wet or dry ) \_\_\_\_\_
  - ii) Actuating system (hydraulic, mechanical) \_\_\_\_\_
- d) Articulation angle, A1 \_\_\_\_\_
- e) Time required for steering from lock to lock \_\_\_\_\_ seconds
- f) Turning radius R1 \_\_\_\_\_ mm
- g) Machine clearance radius R2 \_\_\_\_\_ mm
- h) Minimum turning radius: Bucket tip ( Bucket in carry position ) R3 \_\_\_\_\_ mm
- j) Filtration system \_\_\_\_\_

**2.9 Steering Hydraulics**

- a) No. of cylinders \_\_\_\_\_
- b) Type: Bore (mm) × Stroke (mm) \_\_\_\_\_
- c) Pump:
  - 1) Type and capacity \_\_\_\_\_ lpm at \_\_\_\_\_ rev/min
  - 2) Relief valve setting \_\_\_\_\_
- d) Accumulator; Type \_\_\_\_\_; Capacity \_\_\_\_\_

**2.10 Brakes**

- a) Service; Type \_\_\_\_\_, No. of pedals \_\_\_\_\_
- b) Parking: Type and operation \_\_\_\_\_
- c) Emergency:
  - 1) Type and operation (Fail safe) \_\_\_\_\_
  - 2) Signalling/Alarm system \_\_\_\_\_

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### 2.11 Steering and Braking (For Crawler Loaders Only)

- a) Type (drum, disc; wet or dry) \_\_\_\_\_
- b) Actuating system ( hydraulic, mechanical ) \_\_\_\_\_
- c) Turning radius R1 \_\_\_\_\_ mm
- d) Machine clearance radius R2 \_\_\_\_\_ mm

### 2.12 Tyres and Rims

- a) Tyres:
  - i) Front : Type \_\_\_\_\_ ; Size \_\_\_\_\_ Standard \_\_\_\_\_ Optional \_\_\_\_\_
  - ii) Rear : Type \_\_\_\_\_ ; Size \_\_\_\_\_ Standard \_\_\_\_\_ Optional \_\_\_\_\_
- b) Rims:
  - i) Front : Type \_\_\_\_\_ ; Size \_\_\_\_\_
  - ii) Rear : Type \_\_\_\_\_ ; Size \_\_\_\_\_
- c) Inflation pressure : Front tyres \_\_\_\_\_ Rear tyres \_\_\_\_\_
- d) Number : Front tyres \_\_\_\_\_ Rear tyres \_\_\_\_\_
- e) Ply rating : Front tyres \_\_\_\_\_ Rear tyres \_\_\_\_\_

### 2.13 Hydraulic System

- a) Maximum oil pressure \_\_\_\_\_
- b) Relief pressure \_\_\_\_\_
- c) Lift cylinder :
  - 1) No. of cylinders \_\_\_\_\_
  - 2) Type and size [Bore (mm) × Stroke (mm)] \_\_\_\_\_
- d) Tilt cylinder :
  - 1) No. of cylinders \_\_\_\_\_
  - 2) Type and size [Bore (mm) × Stroke (mm)] \_\_\_\_\_
- e) Pump :
  - 1) Type \_\_\_\_\_
  - 2) Capacity \_\_\_\_\_ m<sup>3</sup>/s at \_\_\_\_\_ rev/min
  - 3) System relief pressures \_\_\_\_\_  
Number \_\_\_\_\_
- f) Control valve :
  - 1) Type \_\_\_\_\_
  - 2) Position: Lift system \_\_\_\_\_ ; Tilt system \_\_\_\_\_
- g) Filter :
  - 1) Type \_\_\_\_\_
  - 2) Size \_\_\_\_\_
  - 3) Flow capacity \_\_\_\_\_

**2.14 Hydraulic Cycle Time at Wide Open Throttle**

- a) Raising time (with load) \_\_\_\_\_ seconds
- b) Lowering time (without load) \_\_\_\_\_ seconds
- c) Dumping time (with load) \_\_\_\_\_ seconds
- d) Total cycle time (Raising/Lowering/Dumping) \_\_\_\_\_ seconds

**2.15 Electrical System**

- a) Starting: Type \_\_\_\_\_; Voltage \_\_\_\_\_ V
- b) Lighting: \_\_\_\_\_; Voltage \_\_\_\_\_ V; Intensity \_\_\_\_\_ lx
- c) Grounding \_\_\_\_\_ positive/negative
- d) Charging: Type *Alternator/Dynamo*; Capacity \_\_\_\_\_ A
- e) Battery: Type \_\_\_\_\_; Capacity \_\_\_\_\_ A

**2.16 Service Refill Capacities**

- a) Cooling system \_\_\_\_\_ litres
- b) Crank case \_\_\_\_\_ litres
- c) Transmission; Clutch/Torque convertor \_\_\_\_\_ litres
- d) Differential and final drives; Front \_\_\_\_\_ litres; Rear \_\_\_\_\_ litres
- e) Bevel gear drives \_\_\_\_\_ litres
- f) Hydraulic tank \_\_\_\_\_ litres
- g) Fuel tank \_\_\_\_\_ litres
- h) Convertor \_\_\_\_\_ litres
- j) Steering \_\_\_\_\_ litres

**2.17 Operating Data (see Fig. 1 and 2)**

- a) Bucket:
  - 1) Type \_\_\_\_\_
  - 2) Capacity, Heaped \_\_\_\_\_ m<sup>3</sup>; Struck \_\_\_\_\_ m<sup>3</sup>
  - 3) Rated load \_\_\_\_\_ kgs
  - 4) Width, W5 \_\_\_\_\_ mm
- b) Height to hinge pin, fully raised, H9 \_\_\_\_\_ mm
- c) Dump height at full lift and 45° discharge H8 \_\_\_\_\_ mm
- d) Dump reach at full lift and 45° discharge, L6 \_\_\_\_\_ mm
- e) Dump reach at 45° discharge angle and 2 130 mm clearance \_\_\_\_\_ mm
- f) Dump reach at 45° discharge angle and \_\_\_\_\_ mm clearance \_\_\_\_\_ mm  
(clearance to be specified by manufacturer)
- g) Dump angle, A2 \_\_\_\_\_
- h) Maximum roll back at carry position, A5 \_\_\_\_\_

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- j) Digging depth, H6 \_\_\_\_\_ mm
- k) Break out force at 100 mm behind bucket cutting edge \_\_\_\_\_ kg
- m) Static tipping load; Straight ahead \_\_\_\_\_ kg; Full turn \_\_\_\_\_ kg
- n) Operating mass \_\_\_\_\_ kg
- p) Shipping mass \_\_\_\_\_ kg
- q) Load on axles under rated operating capacity: Front axles \_\_\_\_\_ kg Rear axles \_\_\_\_\_ kg
- r) Maximum ground bearing pressure under rated operating capacity \_\_\_\_\_ kg/cm<sup>2</sup>
- s) Lift arm control position \_\_\_\_\_ Raise/Hold/Lower/Float
- t) Lift arm control \_\_\_\_\_ Roll back/Hold/Dump

### 2.18 Dimensions (see Fig. 1 and 2)

- a) Overall length, L5 \_\_\_\_\_ mm
- b) Overall height:
- 1) Top of cabin/Exhaust pipe, H1 \_\_\_\_\_ mm
  - 2) With bucket tilted back and fully raised, H10 \_\_\_\_\_ mm
- c) Wheel base, L2 (for wheeled loaders only) \_\_\_\_\_ mm
- d) Thread width, W3 (for wheeled loaders only) \_\_\_\_\_ mm
- e) Ground clearance, H4 \_\_\_\_\_ mm
- f) Length of track on ground, L2 (for crawler loaders only) \_\_\_\_\_ mm
- g) Track gauge W3 (for crawler loaders only) \_\_\_\_\_ mm
- h) Turning radius, R1 \_\_\_\_\_

### 2.19 Standard Equipment

### 2.20 Gauges and Indicators

- a) Engine cooling: Temperature gauge \_\_\_\_\_
- b) Lubricating system: Pressure gauge \_\_\_\_\_
- c) Torque convertor: Pressure and temperature gauge/indicator \_\_\_\_\_
- d) Air pressure/Indicator \_\_\_\_\_
- e) Ammeter \_\_\_\_\_

### 2.21 Attachments Provided \_\_\_\_\_

### 2.22 Accessories/Safety Devices Provided \_\_\_\_\_

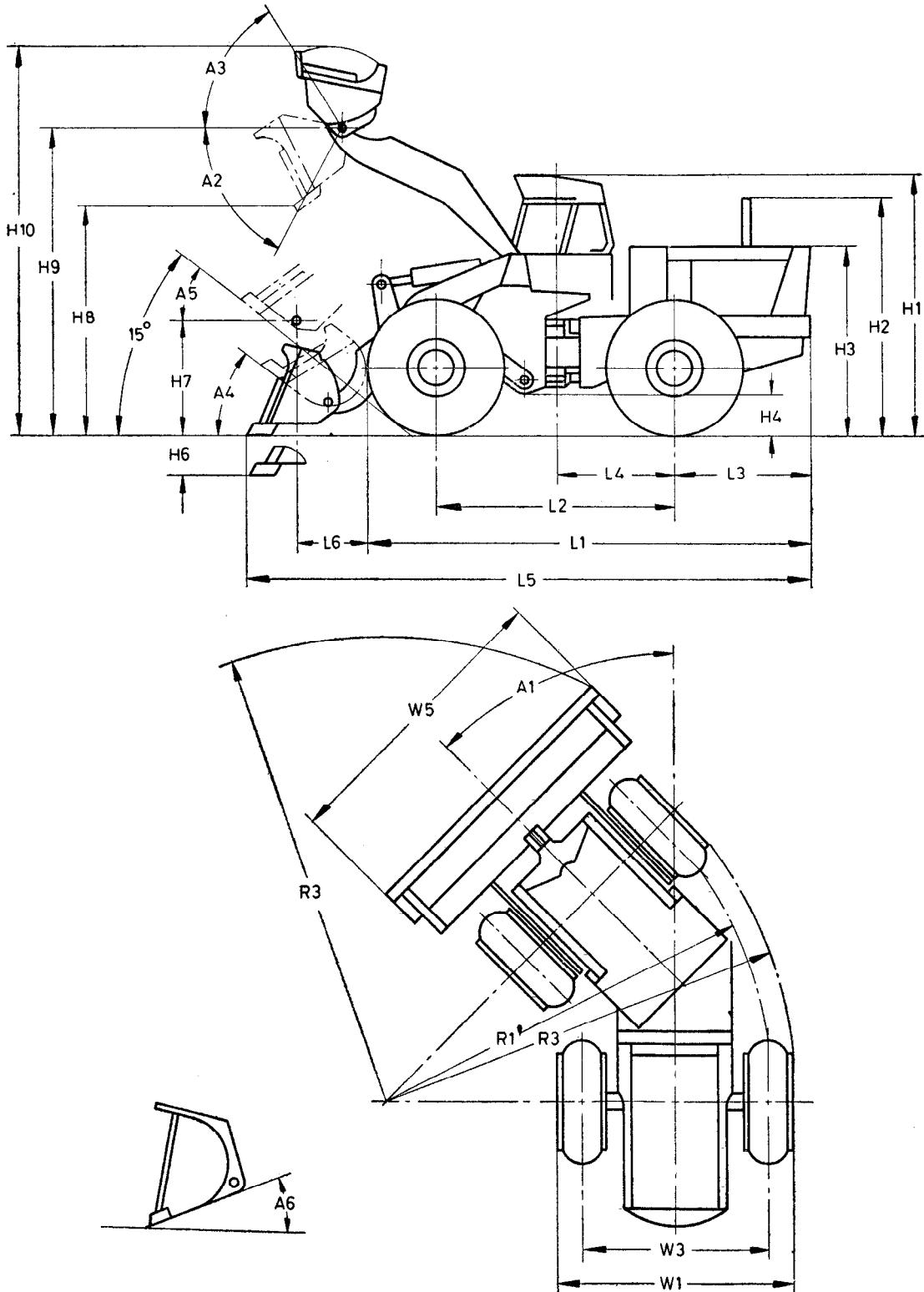


FIG. 2 DIMENSIONS OF BASE MACHINE ( WHEEL LOADER )

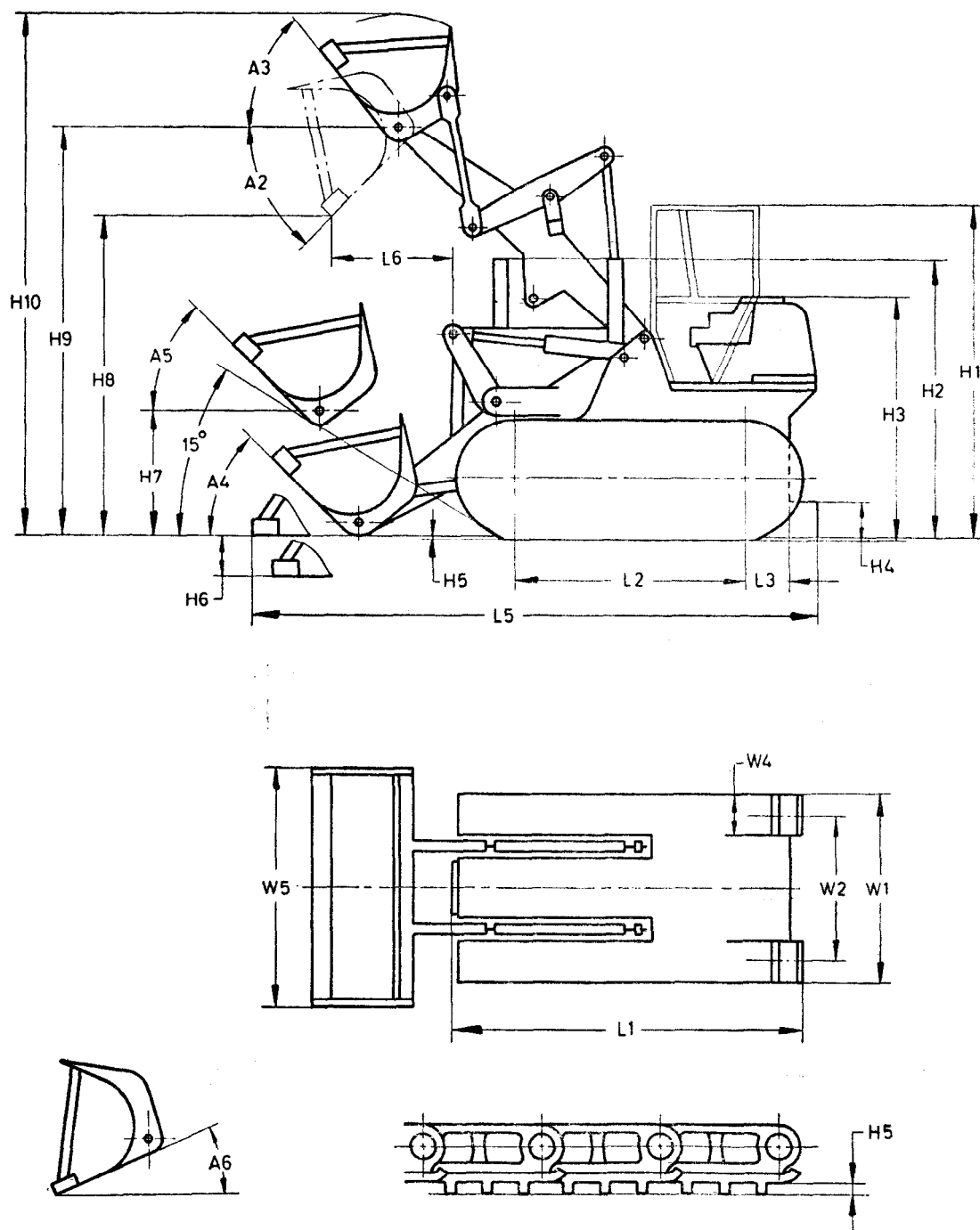


FIG. 1 DIMENSIONS OF BASE MACHINE ( CRAWLER LOADER )